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Abstract. We investigate the empirical validity of the median voter theory of trade policy. Mayer's classic framework predicts that the optimal tariff is positive for a capital-abundant country and negative for a labor-abundant country (Mayer, 1984). However, import subsidies are rare so the tariff level prediction seems unrealistic. In this paper we examine two approaches to reconcile the theory with the lack of "pro-trade" bias across countries. First, we test the variation inequality-tariff prediction proposed by Dutt and Mitra (2002). We find support for it using human capital during the 1980s and 1990s. Using physical capital, the prediction is validated for the 1990s but not for the 1980s. Second, we extend the Mayer framework to a large country. The tariff level in a large country is the sum of the median voter component and a positive terms of trade component. We provide empirical evidence for this level prediction and a positive terms of trade component in the 1990s. Using human capital, we find that the median voter component is positive in capital-abundant countries and negative in labor-abundant countries. Consequently, positive terms of trade effects can overcome the median voter component in labor-abundant countries, reconciling theory with observed protectionism.

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1 Introduction

> "*If, by an overwhelming consensus among economists, trade should be free, then why is it that nearly everywhere we look, and however far back, trade is in chains?*"
>
> Gawande and Krishna (2005)

For decades theorists have been putting forward ideas to explain the existence of protectionism, leading to a large body of theories that endogenize trade policy.[1] Two major categories are special interest and direct democracy theories. Within the direct democracy category, an implication of the median voter theory of trade policy (Mayer, 1984) has been empirically tested for the 1980s by Dutt and Mitra (2002).

The Mayer hypothesis asserts that "each factor owner has an optimal tariff whose value is uniquely related to the individual's factor ownership. In the special case of majority voting with no voting costs, it is the median factor owner's optimal tariff rate that will be chosen to become the actual tariff rate" (Mayer, 1984, pp. 971). In the Mayer-Heckscher-Ohlin setting, when the median voter owns a small share of aggregate capital in the country, the optimal tariff is positive for a capital-abundant country and negative for a labor-abundant country. However import subsidies are rarely observed in practice. As a result, the *level of tariff* prediction seems unrealistic. So how can Mayer's import subsidization result be reconciled with the lack of "pro-trade" bias across countries? We examine two avenues to investigate the empirical validity of the median voter theory of trade policy.

First, we consider a comparative static result of Mayer's model, the *variation in tariffs* prediction. Unlike other models of political economy of trade policy, Mayer's median voter theory provides a clear theoretical relationship between tariffs and inequality. Mayer's variation prediction implies that higher inequality in factor ownership would cause tariff rates to rise in capital-rich countries and to fall in capital-scarce ones. Dutt and Mitra (2002) found support for this inequality-tariff implication for a cross-section of countries in the 1980s, suggesting that the median voter model has some empirical relevance. In this paper, we re-examine the inequality-tariff relationship studied by Dutt & Mitra (2002). Our results show that their finding is not robust. Instead we find that when human capital and (unskilled) labor are taken as relevant factors, the Mayer implication is validated in the 1980s. Using cross-sectional country data, we also find that the Mayer implication holds for the 1990s with either physical capital or human capital. Our findings are robust to several estimation methods including threshold regression. They reveal that the Mayer variation prediction is empirically relevant.

Second, we extend the Mayer model to large countries and consider the *extended level of tariffs* prediction.

[1] See Gawande and Krishna (2005) for a survey of the literature on political economy of trade policy.

Previous work has found strong empirical support for the *optimal tariff argument* which states that large countries set positive tariffs in order to improve their terms of trade. Empirical evidence reveals that even countries with very small shares in world GDP have the ability to influence their terms of trade (Broda et al, 2006 and Olarreaga et al, 1999). So several countries can be considered "large" implying that terms of trade considerations play a decisive role in tariff-setting. Accordingly, we extend Mayer's model to a large country and obtain tariff levels as a function of the median voter component and a positive terms of trade factor. Consequently, if a large labor-abundant country has sufficient market power, the positive terms of trade component dominates the negative median voter component and the optimal tariff is positive. Hence this simple extension overcomes the import subsidization result for labor-abundant countries with sufficient market power. We test the extended level prediction for the 1990s and find a positive relationship between terms of trade considerations and tariff levels across countries. Using human capital, we show that the median voter component has a negative impact on tariffs in labor-abundant countries and a positive impact in capital-abundant countries.

Thus we find empirical support for both the comparative static result and the level prediction of the M-H-O theory. Our results are consistent with micro-level findings of the relevance of human capital as a determinant of preferences over trade policy (e.g. Balistreri (1997), Scheve and Slaughter (2001), Mayda and Rodrik (2005) and O'Rourke and Sinnott (2001)).

The rest of our paper is organized as follows. We start with a discussion of prior work related to the median voter model and the terms of trade theory. The theoretical foundations of the small-country model and its implications are provided in Section 2. In Section 3, we set up the empirical model for the variation prediction. Section 4 explains our data sources and contains a summary of the data used in the paper. Section 5 comprises of our results for the variation prediction. First, we contrast our findings with those of Dutt and Mitra (DM hereafter) for the 1980s. Then we test the Mayer hypothesis using data on both human capital and physical capital in the 1990s. We discuss the results and their robustness. In Section 6, we extend Mayer's model to a large country followed by the empirical model to test the large country level prediction. We lay out the results for the large country level prediction. Finally we present our conclusions.

1.1 Related Work

While DM take an indirect approach, several others have directly examined the validity of the tariff-factor ownership link and found support for it. For instance, Scheve and Slaughter (2001), Mayda and Rodrik (2005)

and O'Rourke and Sinnott (2001) use survey data to confirm that individual preferences over trade policy depend on factor ownership. Balistreri (1997) finds support for HOV in the voting preferences of Canadians regarding the Canadian-US Free Trade Agreement (1989).

Beaulieu and Magee (2004) use Political Action Committee (PAC) contribution data and find that the factor represented by the PAC is more important than industry in determining support for NAFTA and GATT in the US. This is consistent with the M-H-O model in that "capital groups consistently back representatives supporting trade liberalization while labor groups favor protectionists" (pp. 163). So at a more aggregate level than individual data, there is some evidence supporting the level prediction that capital owners favor tariff reductions and vice-versa. But when we consider trade policies across countries, we rarely observe a "pro-trade" bias (Dutt and Mitra 2002, pp. 109). However the empirical validity of the model can be salvaged by two key extensions.

Variation Prediction

The first extension was proposed by DM who tested the variation prediction of the median voter model. Mayer's precise implication for tariffs and inequality is in contrast to other political economy models of trade policy. In particular, DM explain that when a lobbying approach is used in a similar two-sector two-factor constant returns to scale setup such as Rodrik (1986), the opposite prediction follows. An increase in capital inequality results in lower protection in capital-rich countries and vice-versa. On the other hand, when a lobbying model with specific factors is used, there are no clear cross-country predictions since the impact of an increase in inequality on trade barriers is highly sensitive to the costs of forming lobbies in each country (Feenstra 2003, pp. 311-15). Similarly, within the median voter model with specific factors, the relationship between tariffs and inequality is highly sensitive to the median voter's share of each specific factor and the elasticity of substitution between the mobile and specific factor in each sector. DM provide an empirical relationship between tariffs and inequality which is consistent with the M-H-O model. Thus their variation test lends some "tentative" support to the Mayer median voter model.[2]

We use DM's approach of examining the variation prediction and extend their analysis to the 1990s. Our time period covers the liberalization of several countries - at least 13 - which includes some major developing countries (Greenaway et al, 1997). Further, we use new measures of trade restrictiveness following Anderson and Neary (2003). Our results reveal an interesting difference - in the 1980s, the Mayer implication does not find strong empirical support when it is tested for physical capital and unskilled labor but it holds when we

[2]Gawande and Krishna (2005), pp. 11. Note that DM use lagged inequality and perform several checks for endogeneity bias. We follow a similar approach in our estimation.

compare skilled labor with unskilled labor. In the 1990s however, the Mayer implication holds with either physical or human capital.

The relevance of human capital is consistent with previous empirical work on the median voter theory of trade policy. Other than DM, all papers mentioned earlier compare trade preferences of unskilled versus skilled labor rather than physical capital. Thus they corroborate our finding regarding suitability of human capital as the second factor in Mayer's framework.[3] But they use a direct micro-level approach to explore the trade preference-factor ownership link. We are interested in finding out whether the preference of the median voter actually manifests itself in the form of her country's adopted trade policy, so we use DM's approach.

Extended Level Prediction

Second, we extend the Mayer model to a large country and obtain a level of tariff prediction. Within the special interest category of political economy models, the Protection for Sale model (Grossman and Helpman, 1994) has been empirically examined by Gawande & Li (2005) in a large country setup. We consider a direct democracy large country model instead. Our extension to the large country case is consistent with previous work which stresses the importance of terms of trade considerations for several countries. In particular, Olarreaga et al (1999) find that terms of trade considerations account for about 6 to 28 per cent of the explained variation in tariffs across commodities for MERCOSUR countries even though MERCOSUR's share in world imports is just one per cent. Broda et al (2006) emphasize the role of *regional* market power and find that even countries with small shares in world GDP set higher tariffs on account of terms of trade considerations, at both the aggregate and disaggregate levels.[4]

In a large country framework, trade agreements that conform to reciprocity can increase welfare levels of each participating country via reciprocal trade liberalization (Bagwell and Staiger, 1999). Since our time period covers the formation of the World Trade Organization (WTO), we expect WTO members to engage in a mutual re-adjustment of their tariffs. Consequently, we allow the slope parameters of the terms of trade component to be determined separately for members and non-members of the WTO while testing the extended level prediction for the 1990s. As expected, we find that non-members set higher tariffs than members of the WTO. This is consistent with the empirical evidence provided by Bagwell and Staiger (2006) for the terms of trade theory of trade agreements.

[3] Beaulieu and Magee (2004) segregate PACs into corporate PACs and labor PACs so there is no clear distinction between physical and human capital in their paper.

[4] Both these papers include a commodity-level analysis of tariffs so the chosen political economy variables are those implied by special interest group theories.

2 Theoretical Model: Small Country

We retain all the assumptions of the M-H-O model (Mayer, 1984). There are two sectors and two factors - labor (L) and capital (K) - in the economy. Each agent (i) owns a unit of labor ($L^i = 1$) and a certain fraction (σ^i) of the total capital stock in the economy (so $K^i = \sigma^i K$ is person i's capital stock). Labor and capital are needed to produce two goods (1 and 2). Production functions for the two goods are homogeneous of degree one. Both factors are perfectly mobile across these two industries. So a unit of labor earns a wage rate (w) and a unit of capital earns a rental rate (r), irrespective of the industry of employment. An agent who owns a unit of labor and K^i units of capital earns total factor income equal to $w + rK^i$. Thus individual i's share in national rewards from factor ownership is

$$\phi^i = \frac{w + rK^i}{wL + rK} \tag{1}$$

In addition to factor earnings, agents receive a part of the national tariff revenue. Suppose the domestic country imports M amount of good 1. Let t be the domestic import duty or tariff rate imposed on good 1. Let π denote the world relative price of good 1 in terms of good 2. Then the domestic country obtains national tariff revenue worth $T = t\pi M$. Mayer assumes that tariff sharing is neutral with respect to the overall distribution of income. This implies that if agent i earns ϕ^i of the total factor rewards in the economy, then she receives ϕ^i of the total tariff revenue T. In other words, the amount of tariff revenue received by individual i is $T^i = \phi^i T$. Thus individual i's total income (y^i) can be expressed as

$$y^i = w + rK^i + T^i = \phi^i(wL + rK + T) = \phi^i Y$$

On the demand side, Mayer assumes that all agents have identical and homothetic preferences over goods. Both goods are normal and traded in competitive markets. So $p = \pi(1 + t)$ is the domestic price of good 1 in terms of good 2. Consumers have strictly concave utility functions. Individual i chooses the tariff level that maximizes her utility subject to her budget constraint. The optimization problem of individual i can be expressed in terms of her indirect utility function U^i.

$$\max_{t^i} U^i \left(p\left(\pi, t^i\right), y^i \right) \quad , \quad i = 1, ..., I$$

It follows that agent i's optimal tariff choice is $\tilde{t}^i$.

$$\tilde{t}^i = \left(-\frac{Y}{\pi \frac{dM}{dt}} \right) \left(\frac{\frac{d\phi^i}{dt}}{\phi^i} \right) \tag{2}$$

Thus in equilibrium, each voter has an optimal tariff rate that is unique to her factor ownership ratio. According to the median voter hypothesis with single-peaked preferences, the adopted policy is determined by the median voter's (mv) preference. So the adopted trade policy in the domestic country is:

$$\tilde{t} = \tilde{t}^{mv} = \left(-\frac{Y}{\pi \frac{dM}{dt}} \right) \left(\frac{\frac{d\phi^{mv}}{dt}}{\phi^{mv}} \right) \tag{3}$$

Using Equation (1) and Jones' hat algebra,

$$\begin{aligned} \frac{d\phi^{mv}}{dt} &= \left[\frac{L}{(Y-T)^2} \right] (1-\sigma^{mv}) K \left(r\frac{dw}{dt} - w\frac{dr}{dt} \right) \\ &= \left[\frac{wL}{(Y-T)^2} \right] \frac{(1-\sigma^{mv})rK}{(1+t)} \left(\frac{\hat{w}-\hat{r}}{\hat{p}} \right) \end{aligned}$$

This equation implies that the individual-specific income effect depends on two elements - the median voter's capital share relative to the nation (σ^{mv}) and the relative factor intensity of the import industry which determines $\frac{\hat{w}-\hat{r}}{\hat{p}}$. The first element is assumed to be negative across countries i.e. $\sigma^{mv} < 1$.[5]

The sign of the second element depends on the factor abundance of the country. In particular, the derivative is positive for a capital-abundant country and negative for a capital-scarce country. This is because an increase in tariff raises the domestic price of the imported good. So by the Stolper-Samuelson theorem, this results in a higher income share for the agent if she is relatively well-endowed with the factor that is used intensively in the production of the import good. By the Heckscher-Ohlin theorem, a capital-abundant country imports the labor-intensive good while a capital-scarce country imports the capital-intensive good. So in a capital-abundant country, an increase in the price of the imported labor-intensive good will lead to a higher factor reward for labor and a lower factor reward for capital making $\frac{(\hat{w}-\hat{r})}{\hat{p}}$ positive and vice-versa. This implies that the derivative is positive for a capital-abundant country and negative for a capital-scarce country.

Proposition. Small Country Level Prediction:

The median voter in a small capital-abundant country supports tariffs on imports, while the median voter in a small capital-scarce country supports subsidies on imports. Thus by the median voter theorem, small capital-abundant countries support tariffs on imports, while small capital-scarce countries support subsidies on imports.

[5]We confirm this assumption in our empirical work. For further discussion, see Alesina and Rodrik (1994).

Import subsidies are rarely observed in practice. So DM leave this level prediction aside and ask a different question: What happens to trade barriers, if inequality increases, i.e. $\sigma^{mv} \equiv \frac{K^{mv}}{K}$ falls? Using Equation (2) and holding other things equal,

$$\frac{\partial \tilde{t}}{\partial \sigma^{mv}} = -A\frac{(\hat{w} - \hat{r})}{\hat{p}} \tag{4}$$

where $A > 0$. From the earlier argument, this equation yields the following prediction for variation in tariffs across countries.

Proposition. Small Country Variation Prediction:

Higher inequality causes tariff rates to rise in capital-rich countries and to fall in capital-scarce ones.

Thus as pointed out by DM, we can use cross-country data on variations in trade barriers (instead of their actual levels) to assess the impact of differences in inequality on differences in trade policy. This would provide an indication of the empirical validity of Mayer's model.

3 Empirical Model: Variation Prediction

We start this section with an empirical model of the variation prediction. Let t_c be a measure of trade barriers in country c and σ_c^{mv} be a measure of capital equality. Let $k_c \equiv (K/L)_c$ be the mean capital-labor ratio in country c and k^* be the threshold capital-labor ratio that divides countries into capital-scarce and capital-abundant categories. Let γ^{Scarce} denote the parameters to be estimated for capital scarce countries ($k_c \leq k^*$). Similarly let γ^{Abundant} denote the parameters for countries which are relatively capital abundant ($k_c > k^*$). Let ϵ denote the vector of error terms. Since we are interested in the relationship between tariffs and inequality predicted by Equation (4), a linear approximation yields the following empirical model.

$$\begin{aligned} \tilde{t}_c &= \gamma^{\text{Scarce}}\sigma_c^{mv} + \epsilon_c \qquad \text{if} \quad k_c \leq k^* \\ &= \gamma^{\text{Abundant}}\sigma_c^{mv} + \epsilon_c \qquad \text{if} \quad k_c > k^* \end{aligned} \tag{5}$$

The Mayer variation prediction implies that γ^{Scarce} is positive while γ^{Abundant} is negative. But estimation of these parameters entails determination of the threshold value k^* which is unknown. In order to estimate the parameters and the threshold value, DM used the following linear regression with an interaction term.

$$\tilde{t}_c = \gamma_1\sigma_c^{mv} + \gamma_2\sigma_c^{mv}k_c + \gamma_3 k_c + X_c^{'}\delta + \varepsilon_c \tag{6}$$

where X_c is a vector of control variables, δ is a vector of parameters and ε denotes the vector of errors. This specification yields

$$\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}} = \gamma_1 + \gamma_2 k_c$$

If $\gamma_1 > 0$ and $\gamma_2 < 0$, then we obtain a critical capital-labor ratio (k^*) defined by $\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}} = \gamma_1 + \gamma_2 k^* = 0$ which implies that capital-scarce countries have $\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}} > 0$ and capital-abundant countries have $\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}} < 0$. The interaction term in (6) allows the sign of $\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}}$ to vary across subgroups of countries so we get an endogenous split in the sample that groups countries into categories of high and low aggregate capital stock. Thus a test for the Mayer variation prediction is to check if γ_1 and γ_2 estimated using (6) have the expected signs summarized in Table 1. The capital per worker term (k_c) is included to allow the sign of its coefficient (γ_3) to differ from the sign of the interaction term coefficient (γ_2).

The specification in (6) has the advantage of allowing individual determination of the $\frac{\partial \tilde{t}_c}{\partial \sigma_c^{mv}}$ parameters but relies on a restrictive method of estimating the threshold value. In particular, the sum of squared errors is minimized with respect to the parameters but not the threshold value. In order to improve on this estimation, we will supplement the DM approach with the threshold regression method proposed by Hansen (2000) to estimate γ^{Scarce}, γ^{Abundant} and k^* in Equation (5). The method proposed by Hansen (2000) yields parameter and threshold estimates that jointly minimize the sum of squared errors. First parameter estimates are obtained through least squares conditional on a threshold value and then the conditional sum of squared errors is minimized to get the threshold estimate.[6] We will test whether the parameter estimates from the threshold regression have the signs implied by Mayer's variation prediction as summarized in Table 1.

Table 1: Variation Test

Linear Regressions		Threshold Regressions	
Coefficient	Expected Sign	Coefficient	Expected Sign
γ_1	(+)	γ^{Scarce}	(+)
γ_2	(-)	γ^{Abundant}	(-)

[6] A caveat is in order here regarding the threshold estimation. Hansen (2000) notes that when the parameters are same across regimes, the threshold is not identified and standard inference methods are invalid. So the confidence interval for the threshold estimate is based on its likelihood ratio statistic. The validity of this confidence interval relies on the assumption that the difference between the parameters across regimes converges to zero as the sample size gets infinitely large. We will use cross-sectional data for our analysis and have no a priori reason to believe that the tariff-inequality relationship converges across regimes when the sample size increases. As a result we will use Theorem 3 of Hansen (2000) since it does not rely on the convergence assumption. It should be noted however that the confidence intervals in this case are conservative.

4 Data

Sources

Our data sources can be divided into two parts. Part 1 pertains to the 1980s. Part 2 pertains to the time period 1988-2002.

Part 1

To compare our results with those of DM, we use their original dataset for all variables (including capital-labor ratios). Data on inequality - income ginis and share of third quintile in national income - are from the original dataset of DM. In the absence of asset inequality measures, income inequality measures are used as proxies for capital inequality as in DM. We use DM's data on tariff and import duties as measures of trade restrictiveness. *Tariff* is an average of tariffs and charges imposed on imports and weighted by the share of world trade of each good. *Import duties* refer to the total import duties collected as a percentage of aggregate imports.

DM used two other measures of trade protection (X+M)/GDP (share of trade in GDP) and coverage ratio of quotas. However both these measures are unsatisfactory and results using these measures cannot be taken as evidence for or against the Mayer hypothesis. The former is usually higher in smaller countries and is known to suffer from causality issues. And the latter, as pointed out by DM, suffers from severe measurement error. Thus we do not use these two measures in this paper.

For other regressions in part 1, we use data on capital-labor ratios and human capital available in Baier et al (2006). DM use K/L in logarithmic form. We follow this approach for both physical and human capital.

Part 2

For part 2, we use trade restrictiveness indices (TRIs) estimated by Kee et al (2006) for the period 1993-2002. The TRI is based on Anderson and Neary (2003) and has the advantage of being a composite measure of trade protection which accounts for tariffs, duties and non-tariff barriers (See Appendix C for formal definition). Further it does not suffer from underestimation problems unlike the import-weighted average tariff. These indices are not available for the 1980s so for part 1, we use DM's data on tariff and import duties.

Human capital and physical capital estimates for part 2 are from Baier et al (2006). An average of values for 1990 and 2000 were taken. As a robustness check, we use human capital stock estimated by Cohen and Soto (2001). Gini coefficients and quintile shares of income in part 2 are taken from the World Income Inequality

Database (WIID2), which is a corrected and updated version of the Deininger & Squire income inequality database.

Data on the instruments in part 2 - population growth rates, saving rates, M2/GDP and GDP are from World Development Indicators 2005 and on land ginis from the Dutt and Mitra (2002) dataset. Polity variables (political rights and civil liberties) of part 2 are from the Freedom House Gastil Index.

For the level test, data on GDP, labor, population and tax revenue are from World Development Indicators 2006. The non-membership dummy is categorized as one for countries that were not members of the WTO during the time period 1995-2002. Import elasticities, import quantities and import values were taken from the Trade and Production Database of the World Bank. Import elasticities have been estimated using data for the period 1988-2002 (Kee et al 2004). For each variable in our analysis, averages of all available years from 1988 to 2002 were taken so that the effects of explanatory variables on trade barriers could be accounted for. Using different lags of right-hand side variables does not change our qualitative results.

Description

Before laying out the empirical results, we briefly discuss the data used in the empirical tests.

Part 1

Key variables used in the empirical test for the 1980s are tariff, import duty, Gini index, median quintile's share in national income (Q3), physical capital-labor ratio (K/L) and human capital index (HKI).

We use three different measures of K/L ratios. The physical capital-labor ratio ranges from 170 to 166,476 for our largest dataset (Baier et al, 2006). The most capital-scarce country is Madagascar while the most capital-abundant country is Kuwait. The K/L ratios are similar across the three datasets for countries that do not export oil. But there are substantial discrepancies in the K/L ratios of oil-exporting nations. For instance, K/L estimates for Nigeria range from 1,000 to 3,960 and for Venezuela from 20,500 to 47,500. DM used a dummy to indicate oil-exporting countries. We have confirmed the validity of our key results using a dummy for oil-exporting countries. However to avoid bias in the estimates of key coefficients and the turning point due to the discrepancies in K/L data, we have excluded all oil-exporting nations in our regressions. This amounts to dropping two to three observations in each regression.

Tariff ranges from 0.01 to 1.32 across countries. However India is a clear outlier since the maximum tariff

across all countries excluding India is 0.41. Import duty ranges from 0.06 to 41.38 when India is included in the sample. But the maximum import duty falls to 35.7 when India is excluded. Summary statistics for the entire sample of countries are presented in Table 2.

Human capital index ranges from 2.13 (Niger) to 7.14 (USA). Q3 shares are lowest in South Africa while Gini is highest in Lesotho. The highest Q3 shares and lowest Gini indices are in Western Europe and the Czech Republic. Countries showing the lowest political rights ranking are Ethiopia, Guinea, Pakistan and Bolivia.

Table 2: Summary Statistics

Part 1 (1980s)						Part 2 (1990s)					
	Obs	Mean	S.D.	Min	Max		Obs	Mean	S.D.	Min	Max
Tariff	86	0.18	0.17	0.01	1.32	TRI	80	0.17	0.1	0.02	0.55
M-Duty	86	12.1	8.45	0.01	41.4						
Q3	69	14.4	2.43	9.2	18.5	Q3	41	15.48	2.27	11.3	21.1
Gini	56	42	9	26.4	62.6	Gini	80	40.41	10.4	24.8	65
K/L ('000)	102	21	23	0.17	166	K/L ('000)	80	24	23	0.13	80
HKI	102	4.14	1.26	2.13	7.14	HKI	80	4.8	1.35	2.3	7.3

Part 2

For the variation prediction in the 1990s, key variables are the trade restrictiveness index (TRI), Gini index, Q3, K/L and HKI. Summary statistics of these variables for the entire sample of countries are presented in Table 2.

TRI is lowest in Estonia and greater than 0.4 in three countries (Tanzania, Algeria and Nigeria). Our results in the subsequent sections are robust to exclusion of these countries. Inequality measured by Gini is lowest in the Czech Republic and European Union countries. It is highest in Zimbabwe. Once again, Western Europe is the region with highest physical capital while USA is the most skill-abundant. As earlier, Madagascar has the lowest K/L ratio. The most skill-scarce countries are Mali and Ethiopia. Countries with the lowest political rights are Laos, Cameroon, Vietnam and China.

5 Results: Variation Prediction

For the specification in (6), we use TRI (overall trade restrictiveness index) as a measure of t_c in the 1990s and tariffs & import duties in the 1980s. As in DM, we use Income Gini coefficients as well as Q3 (median quintile's share in national income) as proxies for capital inequality.

Comparison with DM results (1980s)

First we present DM's results for the 1980s using the Summers-Heston (S-H) capital data and compare them with our findings.[7] In their paper, DM reported two key regressions - reduced regression (without control variables) and controlled regression (with five control variables). We use the same dataset and sample of countries as DM. We are able to replicate DM's results but find that their results are highly sensitive to the countries included in the sample. Each of their regressions includes India which is a clear outlier. For instance, in the case of tariffs, for a sample of 92 countries excluding India, the mean tariff is 0.16 and the maximum is 0.48. India on the other hand has a tariff of 1.32. This is reflected in the high values of studentized residuals in each regression. The studentized residuals for India range from 8.8 to 14 for tariff regressions and from 4 to 6 for import duty regressions. Thus India is an outlier in each regression. Given the small sizes of samples, this poses an acute problem which can be exacerbated when another influential observation is present in the sample. We find that two of the eight regressions have an influential observation (Sierra Leone) which has absolute DFbeta values in excess of 2 for at least one of the key variables. Exclusion of India and Sierra Leone (when it is an influential observation) from regression samples has a dramatic effect on six out of eight of DM's regression results. The coefficient values for two key variables (inequality measure and interaction term) change and their significance levels drop so drastically that we can no longer reject the null hypothesis that these coefficients are zero. Results for tariffs are presented in Table 3.

It is clear that the coefficient values and significance levels are very sensitive to the countries used in the sample. However the insignificance of key variables cannot be taken as evidence against the Mayer implication because our estimates suffer from a classic symptom of multicollinearity - large standard errors of individual variables and high R-squared coefficients. The bivariate correlation of the inequality term (Gini or Q3) and the corresponding interaction terms ranges from 0.86 to 0.91. We tested for the joint significance of the first two variables Gini (Q3) and Gini*(K/L) (Q3*(K/L)), but our results are inconclusive. For some of the regressions, the null hypothesis of joint insignificance can be rejected but for others it cannot. Further the results are extremely sensitive to dropping of one or two observations. We tried centering the data on Gini and Q3 but the problem persisted.

Results for four other regressions - using tariffs or import duties and Easterly-Levine capital-labor ratios - are similar so they are reported in Tables 1 and 2 in Appendix C. In the remaining two regressions using import duties and Summers-Heston capital-labor ratios, DM's qualitative results do not change when India is dropped

[7] DM used the Nehru-Dhareshwar (ND) capital-labor ratios for their main regressions. We do not report these results due to inconsistencies in the ND dataset which have been confirmed by DM in a personal communication.

Table 3: Dependent Variable: Tariff - Using Summer-Heston's (K/L) ratio

	(a) DM	(b) W/o outliers		(c) DM	(d) W/o outliers
Compare w/DM	Same	Different	Compare w/DM	Same	Different
Gini	-0.144**	-0.046	Q3	0.324***	0.021
	(0.06)	(0.04)		(0.09)	(0.08)
Gini * (K/L)	0.014**	0.005	Q3 * (K/L)	-0.034***	-0.004
	(0.01)	(0.00)		(0.00)	(0.01)
(K/L)	-0.938***	-0.288†	(K/L)	0.275**	-0.037
	(0.26)	(0.17)		(0.13)	(0.12)
Schooling	0.035†	0.013	Schooling	0.005	0.004
	(0.02)	(0.01)		(0.02)	(0.01)
Pol. Rights	-0.006	-0.002	Pol. Rights	-0.051*	-0.023
	(0.03)	(0.02)		(0.03)	(0.02)
SS Africa	-0.345*	0.127	SS Africa	-0.206*	-0.072
	(0.13)	(0.13)		(0.12)	(0.07)
East Asia	-0.257*	0.046	East Asia	-0.126	0.006
	(0.14)	(0.09)		(0.13)	(0.07)
Oil	0.208†	0.146*	Oil	-0.039	0.027
	(0.13)	(0.08)		(0.18)	(0.10)
Constant	9.274***	2.583†	Constant	-2.245*	0.812
	(2.41)	(1.69)		(1.20)	(1.11)
N	31	30	N	33	31
R^2	0.7	0.62	R2	0.54	0.64
(K/L)*	10.3		(K/L)*	9.4	
Obs excluded (#)	0	1 (India)	Obs excl. (#)	0	2 (India, S. Le.)
Student Res.	11		Student Res.	8.8	

Significance Levels: *** 1 percent, ** 5 percent, * 10 percent, † 15 percent.

from the sample. However we detect an endogeneity problem here and cannot reject the null hypothesis of zero coefficients when DM's instrumental variables are used (See Table 3, Appendix C). We used a robust estimation technique (MM-estimation) to cross-check the sensitivity of DM's results. Using the MM-estimator, DM's qualitative results are rejected in five out of eight cases.[8]

Overall the results from DM's controlled regressions using physical capital to test the variation prediction are not robust.

Reduced Specification of DM Regressions (1980s)

In the main regression (Table 3), DM used five control variables - schooling, political rights, oil and two regional dummies for sub-Saharan Africa and East Asia. We argue that some of these control variables are inappropriate. First, using schooling as a control variable has little theoretical justification. It is highly correlated with human

[8]Available at www.sdhingra.com. All unreported results are available from the author upon request.

capital which is a separate factor (correlation coefficient of 0.9). Treating it as a control variable that accounts for development or "people's ability to figure out the dead-weight costs of distortionary government policies favoring special interest groups" is not compelling (Dutt and Mitra (2002), pp. 124). Further the correlation between schooling, K/L and political rights may explain the insignificance of some of these variables.

Second, while controlling for political rights and oil could be justified (See Appendix A for a formal argument), we think that exclusion of countries with low political rights and oil exports has greater merit. As mentioned earlier, exclusion of oil countries is on account of a data issue. However, our key results are robust to using a dummy variable for oil-exporting countries.

Exclusion of countries with low political rights is appropriate because Mayer is concerned with countries which have majoritarian voting. Moreover it can be argued that individuals who have low capital endowment in countries with relatively low political rights are likely to be disenfranchised. So the median voter among the set of effective voters of a low political rights country has a higher income level than would be the case if the country had a better political rights situation. In our dataset, the political rights variable (PR) takes on values from 1 to 7, with 1 indicating the highest level of political rights. We present results for all our regressions using the entire sample as well as a sub-sample of countries with political rights (PR) less than five. The subset of countries with PR less than five corresponds to the top 75 per cent of countries in terms of political rights in our entire sample.

While DM do not report the reduced regressions using the S-H and E-L datasets, we have checked that including the two to three influential countries in the sample would yield results that support the Mayer implication. When these influential observations are dropped, the results once again lead to a rejection of the Mayer hypothesis (Table 10, Appendix B). We find the key terms (inequality and interaction) to be individually significant in only one regression using tariffs. But for the corresponding regression using import duties, we get the unexpected signs on our key estimates (Table 4, Appendix C). Once again there is a multicollinearity problem. The R-squared coefficients for the regressions of inequality, interaction term and capital-labor ratios on each other are over 0.95 in each case. We are able to reject the joint significance of our two key variables in all regressions.[9] Using threshold regressions, we find no support for the Mayer variation prediction using physical capital (Table 12, Appendix B). However it should be noted here that in a different paper, Dutt and Mitra (2006) provide evidence supporting the variation test with an expanded dataset of physical capital. Consequently, we can say that the evidence in favor of the Mayer implication using physical capital in the 1980s is weak.

[9]However this has little meaning in the Q3 regressions as all three variables are highly correlated so we cannot separate their effects.

Human Capital and Trade Barriers

Using physical capital as the relevant factor in Mayer's framework in the 1980s, we can at best say that the test is inconclusive and at worst say that the Mayer implication can be rejected. So the natural question is: Since we do not find strong evidence regarding the Mayer implication in the 1980s, should we abandon the Mayer hypothesis as an explanation for trade protection in this time period? Rejecting the hypothesis would be inconsistent with results from other papers that have found an explicit link between trade preferences and factor ownership of voters and their representatives. Previous work has compared preferences of skilled and unskilled labor so it guides us to regard human capital as the relevant capital variable in Equation (4). And this indeed supports the Mayer hypothesis.

In the remaining part of this section, we present evidence for the Mayer variation prediction for the 1980s and 1990s. A summary of all results discussed in this section is provided below in Tables 4 and 5.

Table 4: Summary Results for Variation Prediction using Linear Regressions

Coef.	Exp. Sign	Physical Capital			Human Capital	
		1980s		1990s	1980s	1990s
		DM w/o outliers	Reduced Reg.	Reduced Reg.	Reduced Reg.	Reduced Reg.
γ_1	(+)	Insignif.	Insignif.	(+)	(+)	(+)
γ_2	(-)	Insignif.	Insignif.	(-)	(-)	(-)

Table 5: Summary Results for Variation Prediction using Threshold Regressions

Coef.	Exp. Sign	Physical Capital		Human Capital	
		1980s	1990s	1980s	1990s
γ^{Scarce}	(+)	(+)	(+)	(+)	(+)
γ^{Abundant}	(-)	Insignif.	(-)	(-)	(-)
k^*		Sig./Insig.	Sig.	Sig.	Sig.

Sig. = Significant at 5% , Insig. = Insignificant at 5% level

Human Capital and Trade Barriers (1980s)

Using human capital measures, we find support for the Mayer implication using both linear and threshold regressions (TR). Not only are the results statistically significant and robust, but they also have the expected theoretical interpretation. We find that the net effect of inequality on tariffs is positive in countries with higher levels of human capital and negative in countries with scarce human capital resources (Tables 11 and 12, Appendix B). So we find considerable support for the M-H-O model in the 1980s. Results using import duties are similar so they are reported in Table 5 of Appendix C.

Human Capital, Physical Capital and Trade Barriers (1990s)

Our next step is to check the link between trade restrictions and inequality in factor ownership in the 1990s. For this time period, we have a larger dataset and superior measures of trade restrictiveness for our purposes. We use both physical capital and human capital as relevant factors in separate linear and threshold regressions presented in Tables 13, 14 and 15 of Appendix B.

Using linear regressions, we find remarkably similar results for the variation prediction. The Gini (Q3) term in each case is negative (positive) and significant and the interaction term is positive (negative) and significant. Our results are robust and often even stronger when countries with low political rights are excluded. The split in the sample does not show any anomalous categorization (Figure 1) and the results clearly reflect the difference in tariff-inequality relationship across the two categories of human-capital endowment (Figure 2). Using threshold regressions, we find strong evidence for the Mayer variation prediction. Moreover we obtain a similar value for the turning point of the sample.

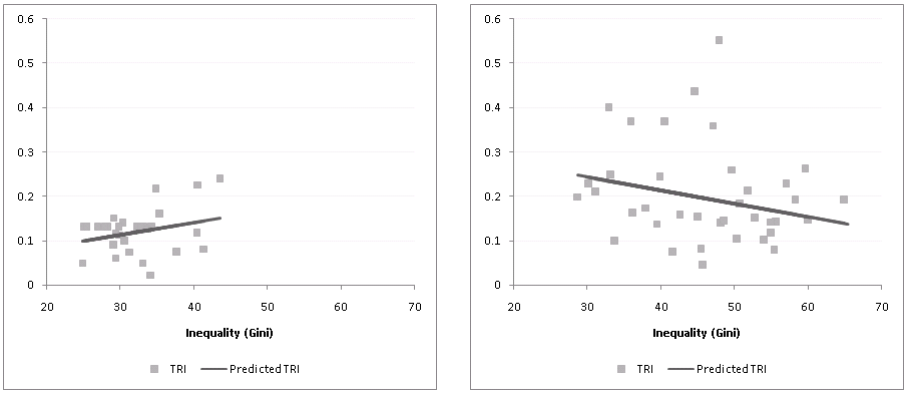
These results imply that higher inequality is associated with greater protectionism in countries with higher levels of physical capital and/or human capital, and with less restrictiveness in countries with lower levels of physical capital and/or human capital during the 1990s.

Figure 1: Countries by Human Capital Index (Corresponds to Table 14, HKI* = 1.5)

Countries with high human capital			Countries with low human capital		
Albania	Finland	Nicaragua	Bangladesh	Kenya	Thailand
Argentina	France	Norway	Bolivia	Kyrgyzstan	Tunisia
Australia	Germany	Peru	Brazil	Laos	Uganda
Austria	Greece	Philippines	Cameroon	Madagascar	Vietnam
Belarus	Hungary	Poland	C. Afr. Rep.	Malawi	Zambia
Belgium	Ireland	Portugal	China	Malaysia	Zimbabwe
Canada	Italy	Romania	Colombia	Mali	
Chile	Latvia	Spain	El Salvador	Mozambique	
Costa Rica	Lithuania	Sweden	Ethiopia	Nepal	
Czech Rep.	Mexico	Switzerland	Ghana	Pakistan	
Denmark	Moldova	UK	Guatemala	Papua New G.	
Ecuador	Netherlands	USA	Honduras	Paraguay	
Estonia	New Zealand	Uruguay	India	Tanzania	

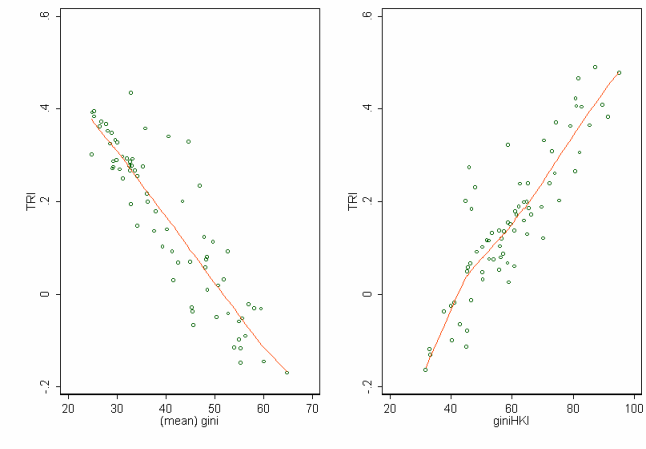
Figure 2: TRI-Inequality Relationship by Human Capital Index, 1990s

Human Capital Abundant Countries | Human Capital Scarce Countries



Corresponds to Table 14 (a)

Figure 3: TRI, Human Capital, Gini (1990s): Non-Parametric Estimation



Local Estimation: $\gamma_1 < 0$ and $\gamma_2 > 0$

Robustness Check

Estimation

We tried other specifications for the threshold regressions. In particular, including an interaction or a squared term for Gini makes no difference to the human capital regressions and these higher-order terms are statistically insignificant. Regarding the physical capital regressions, the interaction term is statistically significant in only one regression and the squared term is never statistically significant.

We also used a non-parametric method to determine the relationship between trade barriers and inequality. We used the formulation of Equation (6) to obtain local estimates from a multivariate smoothing method for

$\tilde{t}_c = f(\sigma_c^{mv}, \sigma_c^{mv} k_c, k_c) + \epsilon$. In Figure 3, we present the relationship between TRI and the key variables - Gini and Gini*HKI - using a partial locally weighted least squares smoother for each independent variable. As expected, local estimation of f yields a TRI-Gini curve with a negative slope and a TRI-Gini*HKI curve with a positive slope. Thus the local estimates are consistent with the results from the linear and threshold regressions.

We also used the MM-estimator for all reduced linear regressions. The variation prediction for physical capital does not hold in three out of four cases. For reduced regressions using human capital, the variation prediction holds in each regression.

Data, Variables and Endogeneity

The key results are unaltered when we use the Cohen-Soto human capital index (Table 6, Appendix C). Our results are not sensitive to treatment of European Union member countries as one observation or to inclusion of a dummy for post-communist countries. Our results do not suffer from endogeneity bias due to presence of σ^{mv} and k as explanatory variables (See Appendix B).

We conclude that evidence supports the Mayer implication regarding trade preferences and ownership of physical capital and/or human capital strongly in the 1990s. In the 1980s, this is true for ownership of human capital but the same cannot be said about physical capital.

Discussion

How do we reconcile our different findings regarding physical and human capital? It can be argued that the reason for our different findings could be simply that data on human capital (H) is better than data on physical capital (K). Therefore we get inconclusive results with the latter in the 1980s. But this does not seem plausible since greater dissatisfaction has been expressed with data on human capital (see de la Fuente and Doménech (2002) for a review).

Another explanation could be that most countries with higher human capital endowment also had a higher physical capital stock in the 1980s. So for the 1980s, H is a better measure of total capital stock (TK) because it not only accounts for skills, but also implicitly takes into account ownership of physical capital (K). If this is the case then H is clearly the correct measure to be used since it robustly captures a link between factor ownership and policy that physical capital measures fail to do.

One approach to resolve this is to combine H and K to obtain a single measure for TK. But this poses some problems. Theoretically, aggregation of different forms of capital implicitly requires assumptions regarding their substitutability or complementarity (See Balassa, 1979, pp. 260). We do not have such explicit knowledge of the relationship between H and K across countries. In fact in the specific case of US trade, Branson and Monoyios (1977) find that the correlation of net exports across commodities is negative and only "marginally significant" with physical capital but, is positive and significant for human capital and negative and significant for labor (pp. 113 and 117). So they advise against aggregation of physical and human capital measures.

Even if aggregation is theoretically justified in our case, it is difficult because of the nature of available data. Physical capital data is available in value terms while human capital is in an index form. So, simple aggregation is infeasible. We tried to combine H and K through two different methods. In the first one we used the stock definition of total capital in Balassa (1979) to aggregate H and K. This required using the discounted difference between skilled and unskilled wages as a proxy for human capital per worker. However using the Freeman-Oostendrop dataset for wages, we were left with very few observations and could not implement this approach. Lack of data also prevented us from using expenditure on schooling across countries to convert the human capital indices into value form. In the second case, we used the Cobb-Douglas production coefficients for human and physical capital as weights to construct a measure of total capital. This index did not support the Mayer hypothesis. To ensure that the discreteness of human capital measures (as opposed to the continuous value form of physical capital) was not responsible for the difference in results across these two forms of capital in the 1980s, we used an index of physical capital instead but that did not satisfy the Mayer hypothesis in the 1980s either.

Thus given our limited success with physical capital in the 1980s, it is reasonable to consider the role of private incentives to invest in different forms of capital. Viewed in the context of the Mayer model, if voters had an incentive to invest in human capital in the 1980s, then K would be more unequally distributed than H during the 80s. Thus the median voter's trade preference would be largely determined by the impact of trade policy on relative wages of skilled and unskilled labor, rather than on relative returns from ownership of physical capital. This is consistent with previous literature on human capital accumulation. Becker (1980) stresses that a greater share of small endowments will be placed in human capital if "small investments in human capital" yield "considerably higher payoffs than those in physical capital" (pp. 130-33). For the US, Hornstein et al (2005) report that returns to education rose dramatically in the 1980s and then grew at a slower pace in the 1990s.

"The return to post-college education doubled from 1970 to 1990...The returns to experience increased in the 1970s and the 1980s and leveled off in the 1990s." (Hornstein et al, 2005, pp. 1283-85).

Hence during this time period, there was an incentive to invest in H. Consequently in the 1980s, H is the primary factor of interest for the Mayer hypothesis and not K. Hornstein et al (2005) report further that in the 1990s, the growth of returns to education had dampened in the US, but equipment-embodied productivity growth was increasing substantially (pp. 1283 and 1293). This would imply that the median voter had an incentive to invest in K as well. So both factors K and H assume a comparable level of importance in the Mayer framework.[10] Though these findings are limited to the US, they suggest a possible role for private investment decisions which can be incorporated within the M-H-O framework to reconcile our different results regarding the validity of the Mayer implication in the 1980s and the 1990s.

6 Large Country

Theoretical Model

Since the variation prediction is empirically validated in both time periods with human capital, we now take the next step to test the M-H-O model. In this section, we retain the original M-H-O framework and extend the model to the case of a large country. We define a "large" country as one that has the ability to manipulate its terms of trade. In other words, holding tariff of the foreign country constant, if the change in world price with respect to a change in domestic tariff is non-zero ($\pi_t \neq 0$) then the domestic country is "large". Following Bagwell and Staiger (1999) we make standard assumptions regarding changes in prices with respect to tariffs. In particular, we assume that a change in domestic tariff of a large home country has a strictly negative impact on world relative price and vice-versa for the tariff (t^*) imposed by the foreign country.

Assumption (1). $\pi_t < 0 < \frac{dp}{dt}$ and $\pi_{t^*} > 0 > \frac{dp^*}{dt^*}$.

Given t^*, individual i in the domestic country chooses a tariff level that maximizes her indirect utility function $U\left(p\left(\pi(t^i, t^*), t^i\right), y^i\right)$. With single-peaked preferences, the median voter theorem implies that the

[10] DM recognize the importance of human capital in their paper as well (pp. 112). But they argue that in the 1980s, physical capital is a good proxy for total capital and therefore, it reflects ownership of human capital as well. However, our results reveal otherwise - H rather than K is the correct measure to be used in the Mayer framework.

tariff adopted in the country is

$$\tilde{t} = \tilde{t}^{mv} = \left(-\frac{Y}{\pi \frac{dM}{dt}} \right) \left(\frac{\frac{d\phi^{mv}}{dt}}{\phi^{mv}} \right) + ToT \tag{7}$$

where

$$\frac{d\phi^{mv}}{dt} = \left[\frac{L}{(Y-T)^2} \right] (1-\sigma^{mv}) K \left(r\frac{dw}{dt} - w\frac{dr}{dt} \right)$$

$$ToT = \left[\frac{\pi}{E^*} \frac{dE^*}{d\pi} \right]^{-1} = \frac{1}{\text{Export Supply Elasticity of good 1}}$$

As in Mayer's small country model, the first component of the optimal tariff is positive in a capital-abundant country and negative in a labor abundant country. But unlike the small country model, there is a non-zero second term which is positive for all large countries. This implies that the median voter in a capital-abundant country always favors positive import tariffs. On the other hand, the median voter in a capital-scarce country favors positive import tariffs if her country has sufficient market power in its import market i.e. $Y \left(\frac{\frac{d\phi^{mv}}{dt}}{\phi^{mv}} \right)$ is greater than $\left(-\pi \frac{dM}{dt}\right) ToT$. Defining the median voter's factor share elasticity as $e_{\phi^{mv}t} \equiv \frac{t}{\phi^{mv}} \frac{d\phi^{mv}}{dt}$ and the world price elasticity as $e_{\pi t} \equiv \frac{t}{\pi} \frac{d\pi}{dt}$, we can re-write the condition for positive tariffs as $\frac{\pi M}{Y} > \frac{e_{\phi^{mv}t}}{e_{\pi t}}$. Thus, as long as the share of imports to GDP exceeds the ratio of median voter's factor share elasticity to world price elasticity, a labor-abundant country will impose positive tariffs on its imports. In this case, the positive impact of the terms of trade component outweighs the negative impact of the median voter component so sufficiently large labor-abundant countries impose positive tariffs. The import subsidization result of the Mayer level prediction is overturned while the Mayer relationship between tariffs and the median voter component is preserved. In particular, as in the Mayer level prediction, the first component of Equation (7) is always positive for a capital-abundant country and negative for a capital-scarce country.

Proposition. Large Country Level Prediction:

The optimal tariff is a sum of the median voter component and a terms of trade component. When Assumption (1) holds,

1. *The median voter in a capital-abundant country supports tariffs on imports because both the median voter and the terms of trade components are positive.*
2. *The terms of trade component in a large labor-abundant country is positive while the median voter component is negative. If the country has sufficient market power so that $\frac{\pi M}{Y} > \frac{e_{\phi^{mv}t}}{e_{\pi t}}$, the positive impact of the terms of trade component outweighs the negative impact of the median voter component and the median voter in a capital-scarce country supports tariffs on imports.*

Thus the unrealistic result of import subsidization in a capital-scarce country does not hold if the country is sufficiently engaged in the world market. Olarreaga et al (1999) remark that "the relevance of the "small" country assumption may be limited to a small number of cases, as Mercosur represents only 1 per cent of world markets, but terms-of-trade effects seem to be relatively important" (pp. 23). Therefore it is likely that several countries across the world can be considered sufficiently large. This implies that the level prediction may not be unrealistic after all.

Importantly from Equation (7), it is clear that the large country extension preserves the variation prediction. The expression for $\frac{\partial \tilde{t}}{\partial \sigma^{mv}}$ is the same, irrespective of the size of a country.

Proposition. Large Country Variation Prediction:

Higher inequality causes tariff rates to rise in capital-rich countries and to fall in capital-scarce ones.

Thus results from the previous section are valid for both small and large countries. We summarize these Mayer hypotheses in Table 6.

Table 6: Variation and Level Predictions of the Mayer Model for Small & Large Countries

Country Type	Assumptions	$r\frac{dw}{dt} - w\frac{dr}{dt}$	$\frac{d\phi^{mv}}{dt}$	ToT	$\tilde{t}$ Level	$\frac{d\tilde{t}}{d\sigma^{mv}}$ Variation
Small K-abundant	$\pi_t = 0$	+	+	0	+	-
Small L-abundant	$\pi_t = 0$	-	-	0	-	+
Large K-abundant	$\pi_t < 0 < \frac{dp}{dt}$	+	+	+	+	-
Large L-abundant	$\pi_t < 0 < \frac{dp}{dt}$	-	-	+	?	+
	$\frac{\pi M}{Y} > \frac{e_{\phi^{mv}t}}{e_{\pi t}}$	-	-	+	+	+

Empirical Model: Large Country Level Prediction

The variation prediction is unchanged when we consider large countries. So this section contains the empirical model to test the level prediction for the large country case. Using the expressions for $\frac{d\phi^{mv}}{dt}$, we can rewrite Equation (7) as follows

$$\begin{aligned}
\tilde{t} = & \left(-\frac{Y}{\pi \frac{dM}{dt}}\right)\left(\frac{\frac{d\phi^{mv}}{dt}}{\phi^{mv}}\right) + & ToT \\
= & \left(-\frac{Y}{\pi \frac{dM}{dt}}\right)\left(\frac{\frac{L}{(Y-T)^2}(1-\sigma^{mv})K\left(r\frac{dw}{dt} - w\frac{dr}{dt}\right)}{\phi^{mv}}\right) + & ToT \\
= & \theta_{mv} MV + & ToT
\end{aligned}$$

where $\theta_{mv} \equiv -\frac{\left(r\frac{dw}{dt} - w\frac{dr}{dt}\right)}{\phi^{mv}\pi\frac{dM}{dt}}$ and $MV = \frac{LY}{(Y-T)^2}(1-\sigma^{mv})K$. We construct MV from available data on GDP, taxes, capital and inequality. From the Mayer level prediction, θ_{mv} is negative in labor-abundant countries and positive in capital-abundant countries. Thus MV decreases tariff levels in labor-abundant countries and increases tariff levels in capital-abundant countries.

In the absence of cross-country export supply elasticity estimates, we impose more structure on the import demand and export supply curves. We adopt the assumptions made in Bagwell and Staiger (2006). In particular, demand for good 1 in the home country is given by $D_1 = a_{1d} - b_{1d}p$ while supply of good 1 in the foreign country is given by $S_1^* = a_{1s}^* + b_{1s}^*\pi$ and $a_{1j}, a_{1j}^*, b_{1j}, b_{1j}^*$ are strictly positive for $j = d, s$. Defining $b_1 \equiv b_{1d} + b_{1s}$ and $b_1^* \equiv b_{1d}^* + b_{1s}^*$, we get that $\pi_t = -b_1\pi/(b_1 + b_1^*)$ which yields $ToT = M/b_1^*\pi$ and elasticity of import demand in the foreign country $\eta^* = b_1^*\pi/M^*$. So we use data on imports and import elasticities to construct the terms of trade component as $ToT = M/M^*\eta^*$. Since the ToT component increases the adopted tariff in the home country, we expect its impact on tariffs to be positive for all countries.[11]

Accordingly, we specify the following estimating equation

$$\tilde{t}_c = \theta_1 MV_c + \theta_2 MV_c k_c + \theta_3 k_c + \theta_{tot} ToT_c + Z_c^{'}\zeta + \varepsilon_c \tag{8}$$

where Z_c denotes a vector of control variables while θ and ζ are parameters to be estimated. In order to test the level prediction, once again we need to estimate the threshold value k^*. We use the DM method of incorporating an interaction term to endogenously generate k^* and to estimate θ.[12] We include an interaction term for ToT and non-membership in the WTO to allow the ToT term to vary by membership status. This follows from the terms of trade theory of trade agreements which implies that members will re-adjust their tariffs to overcome the ToT externality. We expect the coefficient on the interaction term for non-WTO member countries to be positive since tariff bindings tend to lower the ability to manipulate terms of trade.

We estimate Equation (8) and then test whether signs on the key variables agree with those predicted by the extended M-H-O model as summarized in Table 7.

Since our construction of the ToT variable uses import and elasticity data, this formulation leads us to a potential inconsistency of the OLS estimates due to endogeneity of imports and tariffs. As a result we use instrumental variable (IV) regressions. Following the gravity equation literature and work by Broda et al (2006),

[11] We do not have elasticity and import data for all countries in the world. So the denominator of the ToT variable will be smaller by the same amount for all countries in the sample. Hence, we do not expect to obtain a slope parameter equal to one for the ToT term.

[12] Note that $(1-\sigma_c^{mv})k_c$ is a part of MV_c. So by the variation prediction, we must obtain another critical ratio. But $(1-\sigma_c^{mv})$ is positive across countries, so both turning points are equal. Thus, the split obtained from k^* is enough to guarantee that the median voter component and the tariff-inequality relationship are negative in countries with $k_c < k^*$ and positive in countries with $k_c > k^*$. Hence the variation and level predictions are consistent with each other.

Table 7: Level Prediction Test

Variable	Coef.	Exp. Sign
MV	θ_1	(-)
$MV \cdot k$	θ_2	(+)
ToT	θ_{tot}	(+)

we use GDP as an instrument for the terms of trade variable. Unfortunately we cannot use threshold regression estimation for the level test due to lack of results for IV estimation without the convergence assumption and due to the small size of our sample. However we provide non-parametric estimates to cross-check our results for Equation (8).

Level Test: Data

Summary statistics for import-weighted elasticities, units of imports, share in world imports and the median voter term (MV) are provided in Table 8.

Table 8: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
MV	35	1.2	1.35	0.03	5.4
M-wtd. Elasticity	35	1.1	0.065	1.03	1.33
M (bn units)	35	671	1,732.8	8.68	9,225.7
M Share (%)	68	0.7	2.14	0.007	16.21

In our sample, the median voter term is highest in Norway and lowest in Madagascar. Elasticity is lowest in Nicaragua and high in USA and India. None of the countries in our sample have zero imports. Imports are lowest in Madagascar and highest in USA. Import shares range from 0.014 per cent (Malawi and Mali) to 16.3 per cent (USA).

Level Test: Results

Results of the level test using Q3 and elasticity data for the period 1988-2002 are given below. Column (a) of Table 9 contains results for the small country version while column (b) contains results for the large country version (Equation 8) of the level prediction.

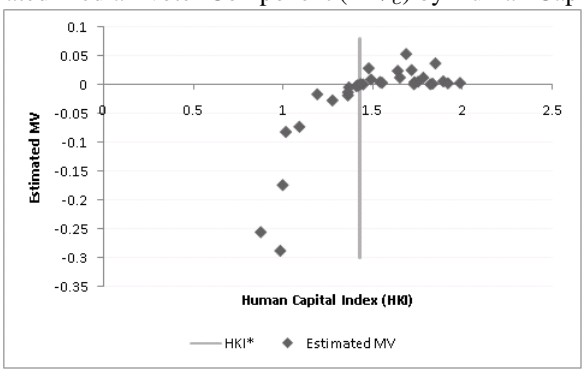
Table 9 shows that the median voter variable and the interaction term are both statistically significant and have the expected signs. This implies that the median voter component is positive in all countries with human

capital greater than HKI* and vice-versa (See Figure 4). The critical HKI* is similar to the turning point from the variation test (Table 14(a)). When the ToT variable is used in the IV regression, three countries - China, Ghana and Tunisia - switch to the high HKI category. Overall the categorization of countries is fairly consistent across the variation and level tests. Inclusion of terms of trade variables increases the R^2 from 0.37 to over 0.45. The terms of trade component is positive and significant so we find evidence that market power increases tariff levels across countries. The interaction between non-membership status and ToT has the expected positive sign suggesting higher terms of trade manipulation among non-members of the WTO. However we have only two non-members in the sample so this must be interpreted with caution.

Table 9: Dependent Variable: Trade Restrictiveness Index

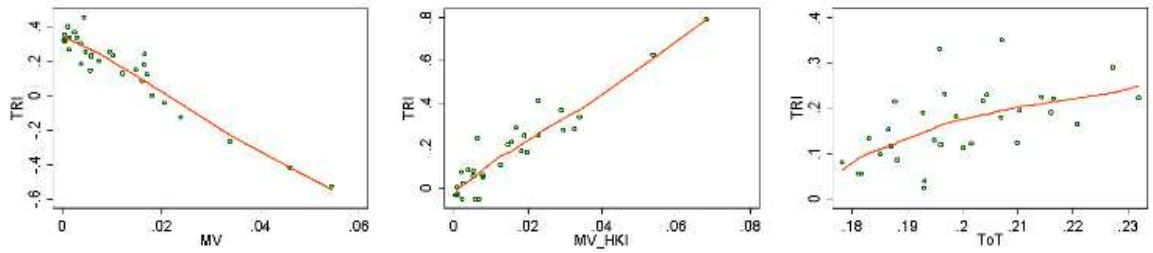
			$ToT = \frac{M}{M^* \eta^*}$		$ToT = M$
Variable	Coef.	Exp. Sign	a) OLS	b) IV	c) IV
MV	θ_1	(-)	-15.37***	-17.14***	-18.12***
			(3.38)	(3.6)	(3.67)
MV·HKI	θ_2	(+)	10.29***	12.01***	12.87***
			(2.26)	(2.59)	(2.72)
HKI			-0.279***	-0.351***	-0.374***
			(.074)	(0.086)	(0.092)
ToT	θ_{ToT}	(+)		3.078**	0.023*
				(1.53)	(0.011)
NM·ToT		(+)		0.452***	0.005***
				(0.131)	(0.001)
Cons.			0.61***	0.096	0.325
			(0.134)	(0.289)	(0.198)
N			33	33	33
R^2			0.36	0.46	0.48
Imports				Units	Value
HKI*			1.5	1.43	1.4

Figure 4: Estimated Median Voter Component (MV_c) by Human Capital Endowment



Estimated $MV_c \lesseqgtr 0 \; for \; HKI \lesseqgtr 1.43$, Corresponds to Table 9 (b)

Figure 5: TRI, Human Capital, MV and ToT (1990s): Non-Parametric Estimation



Local Estimation: $\theta_1 < 0$, $\theta_2 > 0$ and $\theta_{tot} > 0$

Level Test: Robustness Check

Estimation

Once again using locally weighted least squares smoothing for Equation (8), we find that the non-parametric relationships between trade barriers and the key variables have the signs of the Mayer level prediction (Figure 5). The local TRI-MV curve is negatively sloped while the TRI-MV*HKI curve is positively sloped. The TRI-ToT curve is positively sloped as expected from the large country version of the Mayer level prediction.

Alternative Method

The assumptions to arrive at the ToT expression are admittedly strong. So we outline an alternative approach proposed by Olarreaga et al (1999) and use it to cross-check our empirical results. Formally, let T denote the entire world and M_j denote the import demand of country j. Then the supply of the imported good E_c^* to country c can be derived using the equilibrium relationship $E_j^* = M_j$.

$$E_c^* = E_T^* - \sum_{j \neq c} E_j^* = E_T^* - \sum_{j \neq c} M_j$$

Let e_j denote the elasticity of export supply faced by country j, η_j denote the elasticity of import demand of country j and $\lambda_j \equiv E_j^*/E_T^*$ denote the share of country j in the world market. Differentiating the above equation with respect to world price yields the export supply elasticity e_c faced by country c as a function of its import share λ_c.

$$e_c = \frac{1}{\lambda_c}\left(e_T - \sum_{j \neq c} \lambda_j \eta_j\right)$$

Using this equation, Olarreaga et al (1999) argue that a "preferred" proxy for the terms of trade component (e_c^{-1}) is the import share of country c in world markets λ_c since it avoids availability and measurement problems associated with trade elasticities. So following Olarreaga et al (1999), we use import shares as a proxy for ToT and find that the extended level prediction is empirically valid (Table 9(c)).

Data, Variables and Endogeneity

Our qualitative results are not sensitive to use of value or quantities of imports. We use logs in either case to avoid high imports from influencing our results. The qualitative results are similar when population is used instead of GDP as an instrument.

During our sample period, developing country members of the WTO did not have to bind tariffs to the extent required of the developed country members. So we included an interaction term for the terms of trade component of developing country members. In all regressions, the interaction term was positive as expected but statistically insignificant. Our qualitative results for the level prediction were not affected by inclusion of the interaction term.

Following the insight of Tomz, Goldstein and Rivers (2007) that some nonmember participants benefited from the GATT, we also checked if controlling for de facto membership of the GATT has any impact on our qualitative results. There is only one de facto member of the GATT in our sample (Algeria). Excluding this observation or using a dummy variable to control for its effect merely strengthens our qualitative results. Similar results hold when oil exporters are included.

It has been argued in the public finance literature that tariffs may be preferred to other forms of taxation as they can be collected more easily. So it may be possible that our results are driven by the differential ability of high-income and low-income countries in finding alternative sources of revenue.[13] Therefore we use total tax revenue (per cent of GDP) as a control variable in our regressions. All results are robust (and in fact stronger) when total tax revenue is included as an explanatory variable.

Thus during the 1990s, we find evidence of both the Mayer median voter hypothesis and the terms of trade argument for tariff-setting. Capital-abundant countries tend to have higher tariffs while labor-abundant countries tend to have lower tariffs on account of general interest considerations. Terms of trade considerations

[13] See Baunsgaard and Keen (2005) and Gehlbach (2006) for discussion and empirical evidence.

exert a positive influence on tariff levels while WTO membership tends to lower tariff levels.

7 Conclusion

We have tested the Mayer variation prediction using physical capital and labor as well as human capital and labor. Our results show that the Mayer implication finds strong support using human capital but not physical capital in the 1980s. However in the 1990s, the Mayer implication holds with either factor. A possible explanation for our different findings is that the median voter's incentive to invest in different forms of capital changed over the two time periods. Therefore the factors of interest for the Mayer implication changed over time. Our results suggest that voters' decisions regarding choice of investment are relevant issues which can be explored in future research.

The empirical relevance of the Mayer median voter model goes beyond its variation prediction. We extend the Mayer level prediction to large countries. Tariffs in a large country Mayer model are a sum of the median voter component and a positive terms of trade component. Thus the import subsidization result of Mayer (1984) is overcome for large labor-abundant countries.

We test the extended level prediction and find support for it during the 1990s. At even our highly aggregate cross-country level, we find a positive terms of trade component in tariffs. Our results reveal that the median voter component has a negative impact on tariffs in labor-abundant countries and a positive impact in capital-abundant countries. Thus labor-abundant countries tend to be "pro-trade" while capital-abundant countries tend to be "protectionists" as predicted by the median voter theorem. However it remains to be tested whether our level test results generalize to other countries and time periods. Future work in this regard can shed more light on the importance of general interest and terms of trade considerations in determining the direction of tariffs adopted across countries.

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Appendix A: Disenfranchisement[14]

In this Section we present a formal explanation for why countries with low political rights will bias results based on the median voter theorem. Our reasoning is simple. Lowering political rights increases the importance of wealthy individuals in the political process, effectively overrepresenting the rich while disenfranchising the poor. Consequently, estimates using inequality measurements from countries with low political rights will be biased since the "effective median voter" disproportionately reflects the interests of the rich.

Let W stand for wealth and let $f_W(w)$ denote the distribution of wealth across the population within a particular country. We will denote the maximum observed wealth as $\overline{w}$. For example, per capita wealth is given by $\int_0^{\overline{w}} w f_W(w) dw$. In order to capture the effect of political rights in a country, r, we introduce the idea of *disenfranchisement.* In the UN's terminology,

"Rights derive from the inherent dignity of the human person."

for our purposes, this is in opposition to

"Rights derived from status, privilege, and influence associated with wealth."

First we consider a country where all individuals are equal in terms of their voice in governance. We should expect that a group of individuals with wealth in $[w_1, w_2]$ should have "effective voting mass" equal to their "population mass". Formally,

$$\text{Effective voting mass of individuals in } [w_1, w_2] \quad \approx \quad \int_{w_1}^{w_2} f_W(w) dw$$

However, in a country with low political rights we should expect that those with great wealth have a voice in governance disproportionate to their population mass.[15] In other words, in a country with low political rights we should expect that poor individuals are *disenfranchised* which suggests the following heuristic of *disenfranchisement*

$$\begin{aligned} \text{Effective voting mass of wealthy} \quad &> \quad \int_{\text{Wealthy}} f_W(w) dw \\ \text{Effective voting mass of poor} \quad &< \quad \int_{\text{Poor}} f_W(w) dw \end{aligned}$$

A natural way to introduce *disenfranchisement* is then to weight the population mass by a function of wealth and rights, say $e(w, r)$ (for *enfranchisement)* where we assume that:

1. Enfranchisement $e(w, r)$ is normalized for each r

$$\int_0^{\overline{w}} e(w, r) f_W(w) dw \quad = \quad 1$$

2. For rights r, less political rights $r' < r$ magnifies *disenfranchisement* in the sense that

$$r' < r \text{ implies} \quad \frac{e(w,r')}{e(w,r)} \quad \text{is strictly increasing in } w$$

When political rights r' are less that rights r for sufficiently low wealth w_L, "poor" individuals are less enfranchised under r' than under r, formally $e(w_L, r') < e(w_L, r)$. Also, "rich" individual with sufficiently high wealth w_H are more enfranchised under r' than under r, formally $e(w_H, r') > e(w_H, r)$. So (2) captures the

[14]The argument for disenfranchisement is due to John Morrow.

[15]Or at least disproportionate *relative* to those countries with higher political rights. Our formal definition cares only about relative differences.

idea that as rights decrease, the poor have increasingly less "effective votes" and the wealthy have increasingly more "effective votes." Given an enfranchisement function $e(w,r)$, we define m_r as the *effective median voter with rights r* by

$$m_r \equiv \int_0^{m_r} e(w,r) f_w(w) dw = \frac{1}{2} \tag{9}$$

Proposition. *(Rights) Lowering political rights increases the wealth level of the effective median voter.*[16]

Proof. Fix some level of rights r and suppose $r' < r$. The effective median voter at the two rights levels, say m_r and m'_r, are given by (9), and we intend to show that $m_{r'} > m_r$. Define $h(w)$ by $h(w) \equiv \frac{e(w,r')}{e(w,r)}$ and since each e is continuous in w and and > 0 on $[0, \overline{w}]$, so is h. From 2, h is also strictly increasing in w. Now define

$$\begin{aligned} g(z) &\equiv \int_0^z e(w,r) f_W(w) dw - \int_0^z e(w,r') f_W(w) dw \\ &= \int_0^z e(w,r) f_W(w)[1 - h(w)] dw \end{aligned} \tag{10}$$

Clearly g is continuous and it follows from 1 that $g(0) = g(1) = 0$. Examining 10, since $h < 1$ implies $g(1) > 0$ and $h > 1$ implies $g(1) < 0$ there exist w_1, w_2 with $h(w_1) > 1 > h(w_2)$. By continuity of h there exists a w^* s.t. $h(w^*) = 1$ and since by 2 h is strictly increasing, this w^* is unique. Examination of 10 shows that

$$\begin{aligned} g(z) &\quad \text{is strictly increasing on} \quad [0, w^*] \\ g(z) &\quad \text{is strictly decreasing on} \quad [w^*, \overline{w}] \end{aligned}$$

Since $g(0) = g(1) = 0$, this implies that $g > 0$ on $(0, \overline{w})$. In particular, we have

$$\begin{aligned} g(m_r) &= \int_0^{m_r} e(w,r) f_W(w) dw - \int_0^{m_r} e(w,r') f_W(w) dw \\ &= \frac{1}{2} - \int_0^{m_r} e(w,r') f_W(w) dw > 0 \end{aligned}$$

so that $\int_0^{m_r} e(w,r') f_W(w) dw < \frac{1}{2}$ which implies $m_{r'} > m_r$ as desired.

Appendix B

Trade Restrictiveness Index

The TRI is defined as the uniform tariff that would maintain imports of the country at the same level as the existing tariff structure i.e.,

$$TRI_c | \sum_n m_{c,n}(TRI_c) = \sum_n m_{c,n}(t_{c,n}) = m_c^0$$

where, $m_{c,n}$ is the import of good n by country c, m_c^0 is its existing import bundle and $t_{c,n}$ is its current protection level (tariffs, duties, tariff equivalents of NTBs) for each import good n. It captures the trade "distortions imposed by each country's trade policies on its import bundle". (Kee et al, 2006). If we totally differentiate the above equation, we get that

$$TRI_c = \frac{\sum_n \left(\frac{dm_{c,n}}{dp_{c,n}} \right) t_{c,n}}{\sum_n \left(\frac{dm_{c,n}}{dp_{c,n}} \right)}$$

[16] We will also assume the following regularity conditions: f_W and $e(\cdot, r)$ are continuous in w and > 0 on $[0, \overline{w}]$.

where $p_{c,n}$ is the price of good n in country c. So, TRI_c is a weighted average of trade restrictions in country c.

Additional Empirical Results

This part contains results that correspond to regressions reported in the main body of the paper. We include results for endogeneity tests since trade policy can affect the production structure of the economy, which in turn would have an impact on accumulation and the steady state level of capital. Moreover, trade policy can affect inequality in the country. Endogeneity yields inconsistent OLS estimates so we follow the approach taken by Li et al (1998) and used in DM to test for endogeneity bias. The suspected endogenous variables are σ^{mv}, $\sigma^{mv}k$ and k. As in DM, we use instrumental variables - saving and population growth rates (Solow growth model parameters), land gini (measure of initial distribution of land), ratio of money (M2) to GDP (measure of financial development), civil liberties (measure of political factors as a structural variable) and the exogenous variables in the regression equation for auxiliary regressions of our suspected endogenous variables. The residuals are then used as right-hand side variables and tested for their joint significance. In our main regressions, we do not encounter any endogeneity problems so all results are reported in the corresponding tables. DM do not report instrumental variable regression results for the Summers-Heston and Easterly-Levine datasets. But using the Nehru-Dhareshwar dataset, they find endogeneity in only one regression using tariffs.

Physical Capital (1980s)

Table 10: Dependent Variable: Tariff

	(a)	(b) PR < 5		(c)	(d) PR < 5
Gini	-0.011	0.011	Q3	0.026	0.103†
	(0.02)	(0.02)		(0.06)	(0.07)
Gini * (K/L)	0.001	-0.001	Q3 * (K/L)	-0.004	-0.011†
	(0.00)	(0.002)		(0.01)	(0.01)
(K/L)	-0.115	-0.063	(K/L)	0.012	0.084
	(0.08)	(0.083)		(0.10)	(0.11)
Constant	1.164†	0.698	Constant	0.238	-0.611
	(0.80)	(0.84)		(0.99)	(1.08)
N	42	30	N	47	30
R^2	0.5	0.7	R^2	0.44	0.7
Endog. F-statistic	0.4		Endog. F-statistic	1.35	
Endogeneity N	30		Endogeneity N	33	
Joint test F-statistic			Joint test F-statistic		
(Gini and Gini*(K/L))	1.28	0.69	(Q3 and Q3*(K/L))	1.77	1.28

Human Capital (1980s)

Table 11: Dependent Variable: Tariff

	(a)	(b) PR < 5		(c)	(d) PR < 5
Gini	-0.031***	-0.025	Q3	0.071*	0.148***
	(0.01)	(0.018)		(0.04)	(0.05)
Gini * HKI	0.022***	0.016	Q3 * HKI	-0.056**	-0.1***
	(0.01)	(0.012)		(0.03)	(0.03)
HKI	-1.109***	-1.03**	HKI	0.662†	1.222**
	(0.31)	(0.441)		(0.43)	(0.50)
Constant	1.784***	1.76**	Constant	-0.622	-1.612**
	(0.48)	0.71		(0.61)	(0.71)
N	42	30	N	47	32
R^2	0.5	0.6	R^2	0.4	0.6
Endog. F-statistic	1.25		Endog. F-statistic	1.65	
Endogeneity N	34		Endogeneity N	33	
HKI*	1.42		HKI*	1.27	1.49

HKI* = Critical HKI Value

Threshold Regression: Trade Barriers, Physical Capital and Human Capital (1980s)

Table 12: Dependent Variable: Tariff

	Physical Capital (K/L)				Human Capital (HKI)			
	(a)		(b) PR < 5		(c)		(d) PR < 5	
	Scarce	Abun.	Scarce	Abun.	Scarce	Abun.	Scarce	Abun.
Gini	-.004**	.002	-.01***	.002	-.007**	.007***	-.01***	.006**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)	(0.003)
Cons	.44***	-.026	.81***	-.026	.55***	-.191**	.89***	-.026
	(0.1)	(0.095)	(0.151)	(0.07)	(0.12)	(0.09)	(0.151)	(0.072)
Obs	22	20	11	19	19	23	11	19
N	42		30		42		30	
R^2	0.7		0.8		0.6		0.7	
k^*	9.96 (Sig.)		9.96 (Insig.)		1.5 (Sig.)		1.5 (Sig.)	

Sig./Insig. = Significant/Insignificant at 5%

Physical Capital (1990s)

Table 13: Dependent Variable: Trade Restrictiveness Index

	(a)	(b) PR < 5		(c)	(d) PR < 5
Gini	-0.017**	-0.014**	Q3	0.13***	0.13**
	(0.01)	(0.01)		(0.05)	(0.06)
Gini * (K/L)	0.002**	0.002**	Q3 * (K/L)	-0.014***	-0.014**
	(0.00)	(0.00)		(0.01)	(0.01)
(K/L)	-0.088***	-0.071**	(K/L)	0.19***	0.195**
	(0.03)	(0.03)		(0.07)	(0.076)
Constant	0.952***	0.78***	Constant	-1.67**	-1.7**
	(0.31)	(0.31)		(0.67)	(0.762)
N	72	61	N	37	30
R^2	0.15	0.15	R^2	0.24	0.23
(K/L)*	8.9	8.7	(K/L)*	9.3	9.5

Human Capital (1990s)

Table 14: Dependent Variable: Trade Restrictiveness Index

	(a)	(b) PR < 5		(c)	(d) PR < 5
Gini	-0.014**	-0.011**	Q3	0.13**	0.175***
	(0.01)	(0.01)		(0.055)	(0.061)
Gini * HKI	0.009**	0.008**	Q3 * HKI	-0.08**	-0.108***
	(0.00)	(0.00)		(0.03)	(0.036)
HKI	-0.451***	-0.364**	HKI	1.12**	1.466***
	(0.03)	(0.15)		(0.468)	(0.491)
Constant	0.848***	0.691***	Constant	-1.584**	-2.19***
	(0.25)	(0.25)		(0.762)	(0.803)
N	72	61	N	37	30
R^2	0.2	0.2	R^2	0.36	0.41
Endog. F-statistic	0.87		Endog. F-statistic	1.35	
Endogeneity N	35		Endogeneity N	30	
HKI*	1.5	1.44	HKI*	1.6	1.62

Threshold Regression: Trade Barriers, Physical Capital and Human Capital (1990s)

Table 15: Dependent Variable: TRI and Threshold Variable: (K/L)

	Physical Capital (K/L)				Human Capital (HKI)			
	(a)		(b) PR < 5		(c)		(d) PR < 5	
	Scarce	Abun.	Scarce	Abun.	Scarce	Abun.	Scarce	Abun.
Gini	-.004***	.003***	-.004***	.003***	-.004***	.003**	-.005***	.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Cons	.36***	.014	.37***	.013	.37***	.034	.4***	.023
	(0.07)	(0.04)	(0.08)	(0.035)	(0.07)	(0.041)	(0.08)	(0.034)
Obs	26	46	17	44	30	42	15	46
N	72		61		72		61	
R^2	0.3		0.3		0.3		0.3	
k^*	9.11 (Sig.)		9.11 (Sig.)		1.45 (Sig.)		1.45 (Sig.)	